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Requantifying the Rate of Incrementality for the Canada Small Business Financing Program

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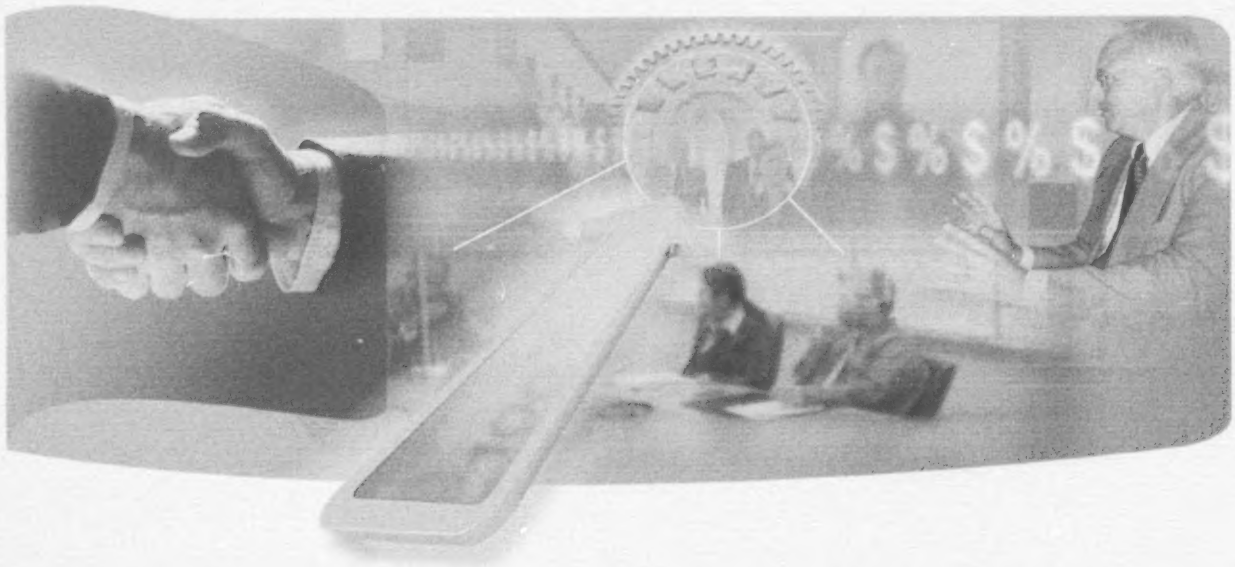

Small Business Branch
Research and Analysis Directorate

Daniel Seens and May Song

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1. Introduction

It has long been known that small and medium-sized enterprises (SMEs)[1] play a major role in the Canadian economy. Data compiled by Industry Canada and Statistics Canada have revealed that SMEs account for over 99 percent of the 1.1 million employer businesses in Canada and that they contribute about 52 percent of Canada's private sector gross domestic product (GDP) (Industry Canada, 2013). Data have also revealed that Canadian SMEs are responsible for about 90 percent of Canada's private sector employment growth (Industry Canada, 2013). That being said, various concerns remain regarding the ability of SMEs to continue to grow, a major reason for which is a lack of financing. In fact, data from the 2011 *Survey on Financing and Growth of Small and Medium Enterprises* showed that about 94,000 Canadian SMEs consider obtaining financing to be a serious obstacle to their growth. The federal government has various programs to assist SMEs in accessing financing, most notably the Canada Small Business Financing Program (CSBFP). The CSBFP is a loss-sharing program designed to stimulate lending through a joint government / private sector agreement. The program has existed in some form since 1961, and a perennial question is the extent to which it has assisted businesses in accessing financing that they would not otherwise have been able to access in the absence of the program. This is a question of financial incrementality, or "financial additionality." More specifically, financial incrementality refers to whether the financing would have been available from private sector lenders in the absence of government support. It has been argued that guaranteeing loans that are not incremental can be a waste of taxpayer capital as the loans would likely have been supplied anyway (Adams, 2012).

This paper presents an econometrics-based analysis to measure CSBFP loan incrementality. The paper begins with a literature review in section 2. In section 3, an empirical framework for regression analysis is presented. Section 4 showcases the results of the regression analysis and section 5 summarizes the study's main conclusions.

2. Literature Review

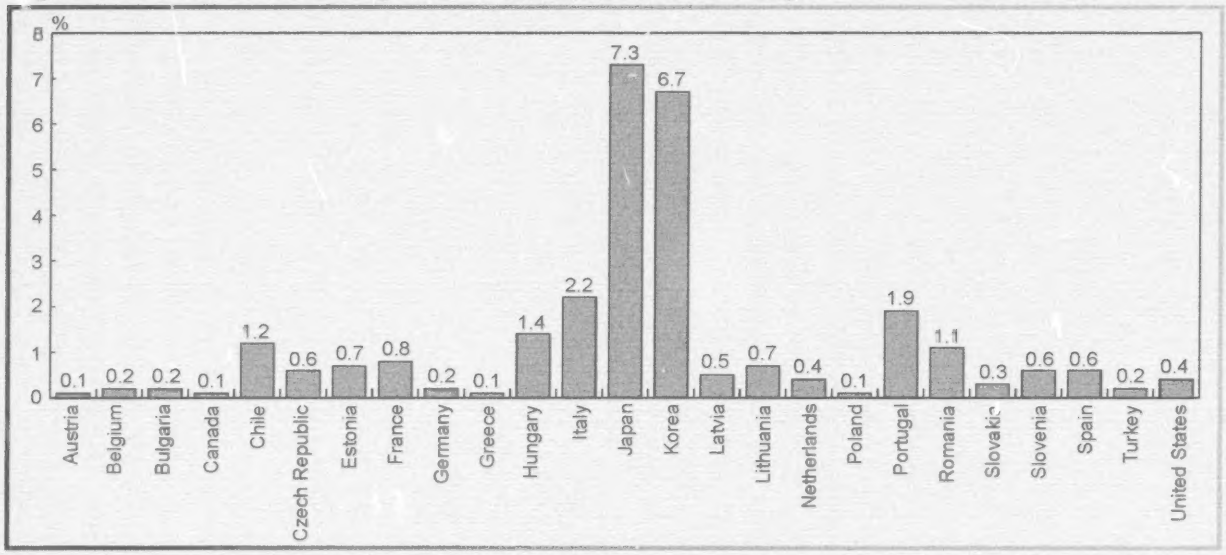
2.1 Operational Characteristics of Loan Guarantee Schemes

Loan guarantee schemes (LGSs) are a common tool used by governments around the world to improve access to financing for SMEs. SMEs frequently face more difficulties accessing financing due to greater loan default risk, greater year-to-year fluctuations in sales and earnings, shorter credit histories and inadequate collateral (Seens, 2013). Without sufficient protection (i.e., collateral and/or co-signing agreements), lenders are more likely to reject these businesses' requests for loans. LGSs are used in response to these situations, i.e., they reduce lenders' losses on defaulted loans by reimbursing a portion of losses after realization on any security. This effectively lowers the credit risk of the SME and encourages lenders to extend financing.

1. Small businesses are defined as businesses with 1–99 employees; medium-sized businesses are defined as businesses with 100–499 employees.

LGSs have been around since the early 20th century (Beck et al., 2010). Data reveal that there are over 2,250 LGSs available in over 100 countries (Green, 2003). Their use grew substantially during the recent global financial crisis and economic recession to expand credit markets and improve financial inclusion (OECD, 2012). Many countries where LGSs were not originally available developed schemes as part of their anti-crisis programs and to counteract cyclical pressures. Figure 1 presents the value of outstanding loan guarantees as a percentage of GDP for 25 countries worldwide.

Figure 1: Value of Outstanding Loan Guarantees as a Percentage of GDP



Sources: OECD, 2012. "The Role of Credit Guarantee Schemes and Mutual Guarantee Societies in Supporting Finance for Small and Medium-Sized Enterprises." CSBFP, 2014. "Internal records."

The structure and delivery mechanism of LGSs vary across countries depending upon the market needs and policy objectives of the guarantors (i.e., the bodies that guarantee the loans). There are two main types of schemes—those administered by business foundations or commerce groups (mutual guarantee associations) and those administered by regional or national governments (loan guarantee funds) (OECD, 2006). The operational characteristics of both types of schemes are similar. The typical relationship involves (1) SMEs that request financing from, and pay fees and interest to, lenders; (2) lenders that assess the creditworthiness of borrowers, disburse funds, collect interest and pay fees to guarantors; and (3) guarantors that collect fees and reimburse lenders for a portion of any defaulted loans.

While the technical aspects of LGSs typically vary across countries and schemes, they all generally respond to the specific objectives of the guarantors, such as alleviating financial distress for micro- and small enterprises (e.g., India's Credit Guarantee Fund Scheme), providing financial support to established growth companies (e.g., Denmark's Vaekstfonden), and/or stimulating regional economic development, investment, research and

development (R&D), and overall business productivity (Riding et al., 2007). The extent to which guarantors are involved in the credit review process varies. In some countries, the credit evaluation process and the decision to grant a loan rest entirely with the lender. The lender submits a loan guarantee application to the guarantor, which then approves or rejects the application based on whether the business meets certain eligibility criteria, such as whether it operates in a certain industry and/or whether it falls below a certain size threshold defined in terms of assets, annual revenues or the number of employees (OECD, 2012). Alternatively, in some countries, the guarantor is intimately involved in the loan application process, handling the credit evaluation process, the guarantee and the disbursal of funds. In these cases, guarantors typically contend that they have greater ability to ensure that loans are, in fact, incremental and not simply a transfer of risk (Riding et al., 2007).

The basic structure of loan guarantee arrangements implies both an agency relationship between borrowers, lenders and guarantors (Riding, 2009) and a moral hazard problem (Lelarge et al., 2009). The moral hazard problem arises because the potential loss on a defaulted loan is not borne entirely by either the borrower or the lender and is, instead, borne (in full or in part) by the guarantor. This creates an incentive for borrowers to take on riskier projects and decreases the incentive for lenders to thoroughly assess the creditworthiness of borrowers, thereby increasing the probability of loan defaults (Chaney and Thakor, 1985). Guarantors usually put various safeguards in place to protect against this moral hazard problem, which can include coverage ratios, maximum guarantee lengths and fees.[2]

2.2 Canada Small Business Financing Program—Overview and Program Details

The CSBFP was launched on January 19, 1961, as part of a job creation strategy and at that time it was called the Small Business Loans Program. It contributed to the development of SMEs by promoting business start-up and expansion. Under the program, the government made it easier for SMEs to obtain loans from financial institutions by sharing default risks with lenders. At the time of its launch, only seven chartered banks and four types of businesses qualified as eligible lenders/borrowers and, during its first year of existence, the program guaranteed 2,977 loans, totalling more than $25.5 million (CSBFP, 2014).[3] Since its inception, program parameters have been changed many times to strengthen and modernize the program to make it accessible to more SMEs. In addition, the number of financial institutions considered to be eligible lenders has increased and the types of enterprises considered to be eligible borrowers have grown to better reflect business needs. In 1999, the program became the CSBFP.

2. Coverage ratios are particularly important. They define what proportion of a defaulted loan is guaranteed by the guarantor; the greater the coverage ratio the greater the risk of a moral hazard problem. Research shows that while coverage ratios can range from 20 percent to 100 percent depending upon the scheme, Beck et al. (2010) found that out of a pool of 76 recently studied schemes, the median coverage ratio was 80 percent. In addition to coverage ratios, many LGSs impose maximum guarantee lengths (i.e., guarantees that expire after a certain number of years), some spanning as long as 25 years. In their study, Beck et al. (2010) found that the average guarantee length was 10 years. Guarantee fees and administrative fees are also used to protect against moral hazard problems, in addition to providing the main source of funds used to operate the program and to reimburse lenders for loan defaults. Guarantee fees typically include up-front fees and annual fees. Up-front fees are typically set at 2–3 percent of the value of the loan. Annual fees can range between 0.5 and 1.25 percent, but commonly vary based on the size of the loan, use of the loan, quality of any collateral and type of firm requesting the loan. Fees help to discourage borrowers that do not want to pay a fixed fee when applying for a loan. Raising fees has also been shown to increase financial incrementality as only borrowers that cannot obtain financing elsewhere are willing to bear the higher cost (OECD, 2012).

3. In 2011, by comparison, 7,141 loans were guaranteed for a total value of more than $978 million (CSBFP, 2014).

Overall, the CSBFP has been a key tool for stimulating the growth of SMEs in Canada. Between 2003–2004 and 2011–2012, the CSBFP enabled small businesses to access more than 81,000 loans, representing almost $9 billion (CSBFP, 2014). The program's main objectives are to (1) help new businesses get started and established firms to make improvements and expand; (2) improve access to loans that would not otherwise be available to SMEs; and (3) stimulate economic growth and create jobs for Canadians.

SMEs operating for profit in Canada with gross annual revenues of $5 million or less are eligible to participate in the program. Farming businesses, not-for-profit organizations, and charitable and religious organizations are not eligible. Up to a maximum of $500,000 in financing is available for any one borrower. Financial institutions, specifically banks, Caisses populaires and credit unions, deliver the program. The decision to grant a loan rests entirely with the lender. The lender reviews the businesses and makes decisions regarding their loan applications. If approved, the lender registers the loan with the government.

Loans approved under the program can be used for financing the cost of (1) purchasing or improving land, real property or immovables; (2) leasehold improvements; and (3) purchasing or improving new or used equipment. Loans cannot be used to finance items such as goodwill, working capital, inventories, franchise fees and R&D. The cost of using the program depends upon the financial institution that grants the loan. The interest rate may be variable or fixed. With variable rate loans, the maximum interest rate charged is the lender's prime rate plus 3 percent. With fixed rate loans, the maximum interest rate charged is the lender's single family residential mortgage rate plus 3 percent. A registration fee of 2.0 percent of the total amount loaned under the program must also be paid by the borrower to the lender, but can be financed as part of the loan. The registration fee and a portion of the interest are submitted to Industry Canada by the lender to help offset the government's costs of administering the program. Lenders have the option to take security in the assets financed and to request an additional unsecured personal guarantee. Table 1 presents the number of loans guaranteed through the CSBFP between fiscal years 2007–2008 and 2011–2012 by sector.

Table 1: CSBFP Loan Guarantees by Sector, 2007–2008 to 2011–2012

Sectors	2007–2008	2008–2009	2009–2010	2010–2011	2011–2012
Accommodation and Food Services	2,302	1,974	1,603	1,585	1,619
Administrative and Support, Waste Management and Remediation Services	67	73	56	77	59
Agriculture, Forestry, Fishing and Hunting	280	232	186	228	231
Arts, Entertainment and Recreation	182	153	198	182	171
Construction	538	490	594	556	475
Educational Services	83	65	96	126	115
Finance and Insurance	24	37	31	27	30
Health Care and Social Assistance	181	199	228	253	261
Information and Cultural Industries	19	21	16	17	14
Manufacturing	575	423	383	450	381
Mining and Oil and Gas Extraction	153	124	130	145	179
Other Services (except Public Administration)	1,655	1,502	798	702	624
Personal Care Services	7	58	458	422	358
Professional, Scientific and Technical Services	175	165	201	188	171
Real Estate and Rental and Leasing	72	59	61	89	78
Repair and Maintenance Services	4	22	363	310	283
Retail Trade	1,319	1,180	1,118	1,130	1,020
Transportation and Warehousing	1,179	880	869	866	889
Utilities	24	29	28	18	83
Wholesale Trade	91	110	117	83	100
Total	8,930	7,796	7,534	7,454	7,141

Source: CSBFP, 2014. "Internal records."

2.3 Evaluation of Loan Guarantee Schemes

LGSs are typically evaluated along two dimensions: economic incrementality and financial incrementality. Economic incrementality is the first dimension discussed here and refers to the extent to which an LGS generates positive net economic benefits for society, taking into account all loan default costs, labour costs and program fees, and any positive GDP and/or employment contributions. This type of evaluation requires detailed cost-benefit analysis, which has proven to be particularly difficult as the data needed to support such an analysis are relatively scarce. That being said, a study was recently conducted in Korea that analyzed the effects of LGSs on Korean manufacturing firms following the Asian Financial Crisis. The study showed that loan guarantees contribute to firm employment growth and sales growth, as well as an increase in employee wages and overall firm survivability (Oh et al., 2009). Positive economic impacts were also observed in Japan. Specifically, evidence suggests that Japanese LGSs were effective in that they contributed significantly to small business investment and overall levels of efficiency (Uesugi et al., 2006). In the United Kingdom, an assessment of the Small Firms Loan Guarantee (SFLG) scheme concluded that the program generated net benefits to the economy over the first two years of businesses receiving an SFLG loan. Specifically, for every £1 spent, there was a return of £1.05 to the economy through additional economic output (Cowling, 2010). Additional benefits lasting beyond

the initial two-year time period were not included in the study, so total potential impacts may be underestimated. A study of German guarantee banks assessing the fiscal 2009–2015 period drew similar conclusions. Based upon survey data from over 1,200 firms, results indicated that loan guarantees over the period contributed annually to over €3.4 billion in GDP. The study also concluded that loan guarantees boosted government tax revenues and generated over 23,200 new jobs (Schmidt and van Elkan, 2010).

In Canada, two recent studies assessed the economic impacts of the CSBFP. The first study, entitled "Canada Small Business Financing Program: Updated and Extended Economic Impact Analysis," involved an extensive econometrics-based analysis of program use based upon different firm performance metrics (Song, 2014). The study concluded that CSBFP support had a positive impact on revenues, salaries, business profits and value added, whereas it did not have an impact on productivity growth or R&D investments. The second study, entitled "Cost-Benefit Analysis of the Canada Small Business Financing Program," focused on assessing total program benefits against total program costs (Seens, 2015).[4] Based on a nine-year evaluation period (2003–2004 to 2011–2012) and using a 5-percent discount rate to calculate the present values of both costs and benefits, the study showed that for every dollar in cost borne by the program, about $5 in benefits were generated for the Canadian economy.

In addition to evaluating LGSs on how they increase overall economic welfare, it is equally common to assess programs on how they increase the flow of funds to SMEs. This second dimension of evaluation is otherwise known as assessing the program's financial incrementality, and there are various approaches to its measurement. One approach, a method of "comparables," involves comparing groups of firms that received loans with guarantees with a control group of comparable firms that received loans without guarantees. The effects of the loan guarantees on borrower capitalization levels, loan volumes, interest rates, collateral requirements, amortization lengths and business entry rates are then compared statistically between groups (Leone and Vento, 2012). The objective of this approach is to ascertain whether borrowers backed by loan guarantees have better and more affordable access to credit than borrowers not backed by guarantees.

This approach was used by Lelarge et al. (2009) to measure the financial incrementality of France's "OSEO-Garantie" over the 1989–2000 period. The study found that the guarantee scheme helped to significantly improve access to external financing for start-up businesses. It also helped to lower the average interest rate paid by start-ups. The results also showed, however, that while access to credit for small businesses backed by guarantees increased, the probability of those small businesses not repaying their loans was higher. The authors claim this was due to the moral hazard problem, whereby the guarantee attracted riskier borrowers and encouraged riskier lending on the part of lenders.[5]

4. Costs assessed included government employee salary costs, direct operating expenditures, government capital costs, and costs of loan defaults to lenders and government. Benefits assessed included the number of jobs created, incremental salaries and wages paid to new workers, interest revenues earned by lenders, direct and indirect GDP impacts on the economy, and registration and administration fees collected by the program.

5. Chaney and Thakor (1985) address this issue in great detail in their paper "Incentive Effects of Benevolent Intervention: The Case of Government Loan Guarantees," in which they conclude that LGSs create a clear incentive for borrowers to take on riskier projects and for lenders to less thoroughly assess the creditworthiness of loan applicants.

Applying a similar approach to measure the financial incrementality of the Italian *Confidi* (mutual credit guarantee consortia), based on data from its Central Credit Register and Central Balance Sheet Register databases, Mistrulli et al. (2011) show that the scheme helped to maintain the flow of capital to guarantee-backed firms during the 2008–2009 financial crisis, just when credit conditions for Italian firms were at their tightest. Guarantee-backed firms were also found to benefit from lower interest rates relative to other borrowers. Similar to the observations of Lelarge et al. (2009), however, Mistrulli et al. (2011) found that improved credit availability came at the cost of a deterioration in credit quality, such that guarantee-backed firms failed to repay loans more often than non-guarantee-backed firms.

The difficulty in employing a method of "comparables" to measure incrementality is that it is challenging to identify a sufficient number of comparable firms to make up the control group. As a result, the matching procedure and inferences drawn from the statistics can be highly imperfect. In this regard, a supplementary approach is often used that involves surveying lenders or borrowers involved in the program.

Such a survey was recently conducted in Canada by the independent research firm R.A. Malatest & Associates Ltd. The survey, entitled "Canada Small Business Financing Program (CSBFP) Lender Awareness and Satisfaction Study," contains a series of questions posed to Canadian financial institutions, including all of Canada's major banks, as well as over 40 credit unions and Caisses populaires (R.A. Malatest & Associates Ltd., 2014). The survey served various purposes, but was aimed primarily at gauging the level of awareness of and satisfaction with the CSBFP among financial institutions in Canada and measuring the rate of program use and financial incrementality. In total, 860 surveys were completed by lenders at 10 banks and 43 credit unions between February 19 and April 30, 2014. Respondents consisted of loan officers and individuals in comparable positions responsible for small business lending. The survey question especially relevant to this study asked lenders to estimate what percentage of CSBFP borrowers would have been approved for their loan with conditions as favourable as were provided if the program did not exist. There were three possible answers to the question: (1) approved for a loan with the same or more favourable conditions; (2) approved for a loan with less favourable conditions; and (3) rejected. Survey results are presented in Table 2.

Table 2: Estimated Share (percentage) of CSBFP Borrowers that Would be Approved or Rejected if the Program did not Exist

If the CSBFP did not exist, what percentage of borrowers would be:	All Institutions (n = 455)*	Large Banks (n = 287)	Small Banks (n = 49)	Credit Unions/ Caisses populaires (n = 119)
Approved for a loan with the same or more favourable conditions	25	23	24	28
Approved for a loan with less favourable conditions	30	24	43	38
Rejected	46	53	33	33

Source: R.A. Malatest & Associates Ltd., 2014. "Canada Small Business Financing Program (CSBFP) Lender Awareness and Satisfaction Study."

* The lower number of respondents (i.e., 455 versus 860) for this question was due to the lower number of respondents able to provide estimates.

Lenders estimated that only about 25 percent of CSBFP borrowers would have been approved for a loan with equivalent conditions if the program had not existed. Alternatively stated, the rate of financial incrementality is about 75 percent. Moreover, about 46 percent of lenders would have outright rejected borrowers' requests for loans if the program had not existed. Another 30 percent said that they would have approved borrowers' requests, but under less favourable terms.[6]

A third approach used to measure financial incrementality, which is the focus of the next section of this paper, involves the use of credit scoring models. These models are used to determine whether borrowers that receive loan guarantees are, in fact, "bad credits" and, as such, would likely be unable to access financing in the absence of a guarantee. The models are frequently built using binary regression models (e.g., probit or logit models) that identify borrowers that are structurally as similar as possible to each other but that are simultaneously as different as possible from other borrowers, allowing researchers to examine the impact on "loan approval probabilities" of various financial ratios, performance measures and qualitative factors. A logit-based credit scoring model was used in 2007 to assess the financial incrementality of the CSBFP (Riding et al., 2007) and was used again in 2009 (Riding, 2009) as part of the program's comprehensive review. The 2007 study concluded that about 75 percent of loans guaranteed by the CSBFP were, in fact, incremental. The 2009 study concluded that between 80 and 85 percent of loans guaranteed were incremental.

3. Empirical Framework for Regression Analysis

In this section, a framework for regression analysis is presented. Sections 3.1 and 3.2 discuss data and model variables. Section 3.3 provides further details on the methods employed.

3.1 Datasets

Two main datasets were used in the study: (1) Statistics Canada's 2011 *Survey on Financing and Growth of Small and Medium Enterprises* and (2) Canada Revenue Agency's "General Index of Financial Information (GIFI)." The *Survey on Financing and Growth of Small and Medium Enterprises* is a triennial survey distributed to thousands of SMEs across the country that gathers information on SME financing request rates, approval rates, amounts requested and amounts supplied, and reasons for seeking financing and for being denied financing. It also gathers information on the financing application process, firm profiles and demographic characteristics of business owners. GIFI is an extensive longitudinal database of financial statement information built using personal income tax (T1) return data and corporate tax (T2) return data sent by businesses to the Canada Revenue Agency. All GIFI data were linked by business identification number to the *Survey on Financing and Growth of Small and Medium Enterprises* data to enable computation of liquidity, efficiency and performance ratios, as well as various other financial metrics critical to the assessment of borrower credit quality.[7]

6. Although not shown here, the majority of lenders (60 percent) said that this would have involved borrowers pledging more collateral to secure their loans. About 49 percent of lenders indicated that this would have involved reducing the amount of the loan, 43 percent said it would have involved increased borrower equity and 39 percent said borrowers would have been required to pay higher interest rates (R.A. Malatest & Associates Ltd., 2014).

7. Outliers identified in the GIFI data were either removed or adjusted using a nearest neighbour approach.

The 2011 *Survey on Financing and Growth of Small and Medium Enterprises* consisted of 9,977 respondents, and included both incorporated and unincorporated SMEs. The current study, on the other hand, focused specifically on incorporated SMEs because the majority of CSBFP borrowers are incorporated and because the dataset on incorporated SMEs was far richer and more reliable. The target sample for the study included the 2,635 SMEs that sought debt financing (Table 3). Eliminating outliers and observations with missing data reduced the workable dataset to 2,404 SMEs.

Table 3: Sample Size (number of SMEs that sought debt financing in 2011)

		Non-CSBFP Participants		
	CSBFP Participants	SMEs Denied Debt Financing	SMEs Approved for Debt Financing	Total
Total	567	120	1,948	2,635
Incomplete records	51	13	167	231
Total usable records	516	107	1,781	2,404

Source: Statistics Canada, 2011. *Survey on Financing and Growth of Small and Medium Enterprises.*

3.2 Model Variables

The main dependent variable of interest is a binary, or dichotomous, variable that represents the outcome of SMEs' 2011 debt[8] financing applications, taking a value of "1" if the application was approved (partially or fully) and a value of "0" if the application was rejected.[9] The main explanatory variables of interest were taken from businesses' financial statements (income statement and balance sheet). Variables include traditional liquidity, efficiency, growth and performance measures that characterize businesses' earning power and balance sheet health. They were selected given their logical link to the dependent variable (i.e., the lender's approval/rejection decision), data availability and other research highlighting their use in credit scoring analysis (Fabozzi, 2005). Variables and their expected impact on the dependent variable are discussed in Table 4.

In addition to these key financial variables, additional variables can impact a lender's loan approval/rejection decision. As such, the following control variables were also included in the model: business size (i.e., number of employees), business age, owner's age, sector and region of operation.

8. This includes long-term debt repayable after one year and does not include lease or equity financing.

9. Debt represents the primary source of financing used by Canadian SMEs, with approximately 26 percent requesting debt financing, 7 percent requesting lease financing and 2 percent requesting equity financing in 2011 respectively.

Table 4: Explanatory Variables and Definitions

Variable	Definition and Expected Impact on Dependent Variable
Return on assets (ROA)	An indicator of how profitable companies are relative to their total asset base. ROA provides a measure of how efficient management is at converting assets to earnings. It is calculated by dividing a company's annual net income, after tax, by its total asset base and is expressed as a percentage. A higher ROA is expected to have a positive impact on a business' ability to access debt.
Net profit margin	Net profit margin is an indicator of company profitability calculated as net income, after tax, divided by revenues and is expressed as a percentage. It measures how much of every dollar in revenues a business generates it gets to keep. It is particularly useful for comparing companies of different sizes. A higher profit margin indicates a more profitable company that has greater control over expenses compared with similarly sized competitors. A business that has a 15 percent profit margin, for example, retains $0.15 in income of every dollar in sales. A higher net profit margin is expected to have a positive impact on a business' ability to access debt.
Asset turnover	Asset turnover is an operating efficiency measure, calculated by dividing annual sales by total assets, that indicates the effectiveness with which management is deploying its asset base. The higher the ratio the better as it indicates that the firm is generating more in sales for a given asset base. A higher asset turnover ratio is expected to have a positive impact on a business' ability to access debt.
Current ratio	The current ratio is a liquidity measure, calculated by dividing current assets by current liabilities, that indicates a business' ability to pay short-term obligations to lenders, suppliers and government. A higher current ratio is expected to have a positive impact on a business' ability to access debt.
Debt-to-asset ratio	The debt-to-asset ratio is a leverage ratio that measures the proportion of a company's assets that are financed through debt. This provides an indication of a company's existing financial obligations and is an indicator of financial risk. The higher the ratio the higher the degree of financial leverage, the more volatile the company's earnings and, consequently, the greater the financial risk. This is a broad ratio consisting of both long-term and short-term debt (repayable within less than one year), as well as all assets. A higher debt-to-asset ratio is expected to have a negative impact on a business' ability to access debt.
Sales growth	Sales growth was calculated as the compounded annualized rate of growth of a company's revenues over the 3-year period between 2009 and 2012.

3.3 Methods and Estimation Strategy

Estimating the financial incrementality of the CSBFP was accomplished in two steps. In the first step, a logistic-based regression model was developed that modelled lenders' loan approval/rejection decisions based on the loan applications of SMEs that did not use a CSBFP guarantee. As discussed above, the dependent variable was "1" if the application was approved and "0" if the application was rejected, which depended on explanatory variables such as return on assets, business age, asset turnover and sector. The general form of the model is as follows:

$$P_i = E(Y = 1|X_i) = \frac{e^{z_i}}{1 + e^{z_i}} \tag{1}$$

P_i represents the probability of being approved for a loan. $Z_i = X_i'\beta$, where X_i is a $K \times 1$ vector denoting the explanatory variable for the i^{th} individual firm, and β is a $K \times 1$ vector of coefficients, which is constant across individual firms $i = 1, 2, \ldots n$. Alternatively, the probability of $Y = 0$ (the business being rejected for a loan) is given by the following:

$$1 - P_i = \frac{1}{1 + e^{z_i}} \tag{2}$$[10]

To estimate the model given that it is non-linear in both the explanatory variables and parameters, it is necessary to take the ratio of equations (1) and (2), which is the probability that a business will be approved for a loan against the probability that it will be rejected. This generates equation (3), which is the odds ratio of being approved for a loan.

10. It can be verified that Z_i ranges from $-\infty$ to ∞, P_i ranges between 0 and 1, and P_i is non-linearly related to Z_i.

$$\frac{P_i}{1-P_i} = e^{z_i} \tag{3}$$

Taking the natural logarithm of (3) yields the log-odds of the ratio (the logit), L_i, which is a linear function of the βs and the Xs.

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = X_i'\beta + u_i \tag{4}$$

From equation (4), it is possible to estimate the β coefficients that best fit the data.[11] The model assigns each business a score (e.g., a probability estimate of whether the borrower should be approved/rejected for a loan). The premise of the model is that businesses demonstrating attributes resembling those demonstrated by other approved businesses would also likely be approved, whereas businesses demonstrating attributes resembling those demonstrated by other rejected businesses would also likely be rejected.

The second step in estimating the financial incrementality of the CSBFP involved running a sample of CSBFP-backed borrowers through the model to determine what percentage would be approved/rejected for a loan without a guarantee given the model's form and the values used for the explanatory variables. Assuming the model is sound and that all loans guaranteed through the CSBFP are financially incremental, approximately zero percent of CSBFP-backed borrowers should be approved by the model. If approved, borrowers should have been able to access financing in the absence of a guarantee because they were of equal, or comparable, credit quality as those borrowers that were able to access financing without a guarantee. As such, calculating the percentage of CSBFP-backed borrowers in total that would not be approved for a loan according to the parameters of the model provides a direct measure of financial incrementality (Riding et al., 2007).

4. Empirical Findings

Table 5 presents the mean values of all explanatory variables used in the study, broken down by type of borrower—approved, rejected and backed by the CSBFP. As expected, borrowers whose loan requests were approved scored better on most performance metrics than borrowers whose requests were rejected, i.e., on average, approved borrowers displayed stronger returns on assets, net profit margins, sales growth and asset turnover than rejected borrowers. They also displayed lower debt-to-asset ratios. Comparing rejected borrowers and CSBFP-backed borrowers was less clear-cut. Rejected borrowers showed stronger asset turnover than CSBFP-backed borrowers, while CSBFP-backed borrowers showed stronger net profit margins and sales growth and lower debt-to-asset ratios than rejected borrowers. From these relationships, it is clear that approved borrowers are the healthiest firms, rejected borrowers are operationally weak firms that could be headed for bankruptcy, and CSBFP-backed borrowers are "on the fence" between the other two groups of borrowers in a "grey area."

11. To avoid heteroscedasticity of the disturbance term, estimation of the logistic model was achieved using weighted least squares.

Table 5: Mean Values of Explanatory Variables by Type of Borrower—Approved, Rejected and CSBFP-Backed

Variable		Rejected	Approved	CSBFP-Backed
Business Characteristics	Age of SME (years)	18.67	22.33	17.14
	Size of SME (number of employees)	7.49	15.25	10.50
	Owner's age (years)	48.77	50.36	47.17
Sector (%)	Accommodation and Food Services	4.88	8.71	9.88
	All Other	20.98	13.70	13.37
	Construction	17.12	18.17	13.76
	Manufacturing	3.68	11.62	11.24
	Other Services (except Public Administration)	6.22	5.40	5.43
	Primary	2.82	2.89	6.01
	Professional, Scientific and Technical Services	13.60	9.77	7.17
	Retail Trade	15.51	13.57	16.47
	Transportation and Warehousing	10.30	7.43	12.02
	Wholesale Trade	4.88	8.75	4.65
Regional Distribution (%)	Alberta	11.83	14.75	8.53
	Atlantic Canada	7.51	6.29	8.53
	British Columbia and Territories	11.65	16.41	6.01
	Manitoba	1.51	3.80	3.49
	Northern Ontario	6.10	2.81	3.88
	Quebec	24.27	23.97	45.93
	Saskatchewan	1.89	2.86	5.81
	Southern Ontario	35.24	29.11	17.83
Performance Metrics	Return on assets (%)	X	10.22	X
	Net profit margin (%)	-3.29	13.00	2.98
	Asset turnover	3.22	36.28	2.84
	Debt-to-asset ratio	1.23	0.88	0.88
	Current ratio	X	0.02	X
	Sales growth (%)	15.58	71.86	27.00

Sources: Statistics Canada, 2011, *Survey on Financing and Growth of Small and Medium Enterprises*; Canada Revenue Agency, "General Index of Financial Information (GIFI)," 2010–2011; and authors' calculations.
Note: "X" indicates that data were suppressed to meet confidentiality requirements of the *Statistics Act* or for low quality reasons.

Table 6 summarizes the results of the regression analysis. Business age, owner's age and business size are all highly statistically significant and have the expected signs. As business age increases, the value of the logit increases, perhaps because businesses have longer track records; stated differently, the younger the business, the less likely it is to be approved for a loan. Likewise, smaller businesses and businesses with younger owners are less likely to be approved for loans. The coefficients of sector dummy variables in accommodation and food services, construction, manufacturing, other services (except public administration), primary and wholesale trade were positive and significant at the 1 percent significance level. All performance metrics had the expected signs and were statistically significant. The probability of being approved for a loan was positively related to the return on assets, net profit margin, asset turnover, current ratio and sales growth and was negatively related to the debt-to-asset ratio. Interpretation of the various coefficients is as

follows: the more profitable the business, the more efficient the business, the greater its liquidity position and the more solid its performance track record, the higher the probability of the business being approved for a loan. The leverage coefficient is interpreted differently: the higher a business' debt load, the greater the financial risk of the business not being able to service its debt and, therefore, the lower the probability of the business being approved for a loan.

Table 6: Logistic Regression Model of Lenders' Debt Approval/ Rejection Decisions

Variable		Coefficient Estimate	*P*-value
Intercept		0.8900	<0.0001
Business Characteristics	Age of SME (years)	0.0027	0.0061
	Size of SME (number of employees)	0.0298	<0.0001
	Owner's age (years)	0.0166	<0.0001
Sector Dummy	Accommodation and Food Services	0.9228	<0.0001
	Construction	0.4564	<0.0001
	Manufacturing	1.3509	<0.0001
	Other Services (except Public Administration)	0.1856	0.0035
	Primary	0.2644	0.0025
	Professional, Scientific and Technical Services	-0.0763	0.1274
	Transportation and Warehousing	-0.0250	0.6441
	Wholesale Trade	0.7365	<0.0001
	All Other	-0.0763	0.0974
Regional Dummy	Atlantic Canada	0.1764	0.0011
	Quebec	0.2144	<0.0001
	Prairies	0.7154	<0.0001
	British Columbia and Territories	0.7655	<0.0001
	Ontario	0.0000	1.000
Performance Metrics	Return on assets (%)	0.0787	0.0026
	Net profit margin (%)	0.0196	0.0002
	Asset turnover	0.0604	<0.0001
	Debt-to-asset ratio	-0.1992	<0.0001
	Current ratio	0.2856	<0.0001
	Sales growth (%)	0.0086	0.0553

R-squared	0.8328	Observations with dependent variable = 0	107
McFadden R-squared	0.0730	Observations with dependent variable = 1	1,781
Count R-squared	0.7100	Total observations	1,888
Mean dependent variable	0.9350		

Sources: Statistics Canada, 2011, *Survey on Financing and Growth of Small and Medium Enterprises*; Canada Revenue Agency, "General Index of Financial Information (GIFI)," 2010–2011; and authors' calculations.

Note: The conventional measure of "goodness of fit" for the model, R-squared, was 0.83 though it is not overly meaningful in this context with a binary dependent variable. Pseudo R-squared measures discussed in the literature have more validity, such as McFadden R-squared (Gujarati, 2012), which for this model was 0.073. It is also useful to look at the Count R-squared, which is defined as the number of correct predictions as a percentage of the total number of observations. For this analysis, an observation was classified as "1" if the predicted probability of being approved for a loan was greater than 0.935 (the mean predicted probability of all approved borrowers); if less than 0.935, the observation was classified as "0." From this, it is possible to determine the number of correct predictions and the Count R-squared. As presented above, the Count R-squared was 0.710. It should be emphasized that in assessing the strength of binary regression models, what matters most are the expected signs of the coefficients and their statistical significance; goodness-of-fit measures are of secondary importance (Gujarati, 2012). From Table 6 it can be seen that almost all coefficients, and in particular the coefficients of the performance metrics, are statistically significant, at least at the 10 percent level.

Table 7 presents the financial incrementality of the CSBFP based on the results of running the 516 CSBFP-backed borrowers through the regression model.

Table 7: Approved/Rejected CSBFP Borrowers Based upon the Logistic Regression Model, 2011

Total number of borrowers	Approved	Rejected
516	170 (33%)	346 (67%)

Sources: Statistics Canada. 2011. *Survey on Financing and Growth of Small and Medium Enterprises*; Canada Revenue Agency, "General Index of Financial Information (GIFI)," 2010–2011; and authors' calculations.

Based on the data, the model classified 346 of the total CSBFP-backed borrowers as bad credits, such that lenders would have rejected their loan applications. Similarly, the model classified 170 borrowers as good credits, such that the borrowers would likely have been able to access financing without a guarantee as they were of equal, or comparable, financial strength as other borrowers able to access financing without a guarantee. Overall, these results imply a rate of full financial incrementality of 67 percent.

In interpreting this result, it is important to stress that this is the rate of full incrementality and does not include loans that might be partially incremental (loans that might be approved, but under less favourable terms). While it is not possible to say how closely aligned the results would be with the 75 percent rate reported in the "Canada Small Business Financing Program (CSBFP) Lender Awareness and Satisfaction Study" (R.A. Malatest & Associates Ltd., 2014) or the 80–85 percent rate reported by Riding (2009) if loans that were partially incremental were included, the 67 percent rate reported above would almost certainly rise.

5. Conclusions

The main goal of this report, estimating the financial incrementality of the CSBFP, was accomplished in two ways. First, data were presented from the "Canada Small Business Financing Program (CSBFP) Lender Awareness and Satisfaction Study." In total, 860 surveys were completed by lenders at 10 banks and 43 credit unions. Lenders were asked to report what percentage of CSBFP-backed borrowers would have been approved for loans with conditions as favourable as those provided if the program did not exist. Lenders reported that only about 25 percent of CSBFP-backed borrowers would have been approved, which translates to an estimate of financial incrementality of 75 percent. Second, a credit-scoring model was developed to measure financial incrementality of the CSBFP by (1) estimating the parameters of a logistic-based regression model based on the results of the loan applications of 1,888 SMEs that did not use a loan guarantee and (2) using the model to classify a sample of 516 CSBFP-backed borrowers regarding whether they would have been able to access financing without a guarantee. Explanatory variables included in the model were selected based on their logical link to the loan approval/rejection decision, data availability and past research highlighting the importance of the explanatory variables in credit analysis. As expected, financially healthy businesses with stronger net profit margins, returns on assets, liquidity, sales growth and operating efficiency and lower debt-to-asset ratios have a greater chance of

being approved for a loan than financially weak businesses. The model predicted that about 33 percent of CSBFP-backed borrowers would have been approved for a loan given the values used for the explanatory variables, implying a rate of full financial incrementality of 67 percent. While this rate is lower than that reported in previous studies, and although it is not possible to determine how much closer the results would be if partial incrementality was also considered, the incrementality figure would certainly be higher. Nonetheless, a main policy implication from this result is that the CSBFP continues to serve its purpose of providing financial support to businesses that would not likely have been able to access financing without the program. In fiscal 2011–2012 alone, the CSBFP guaranteed 7,141 loans, 4,784 of which would not likely have been granted without the program.

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